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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/583,028

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Harue Nakashima

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31780

7590

03/17/2010

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EXAMINER

CLARK, GREGORY D

ART UNIT

PAPER NUMBER

1794

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/583,028	<b>Applicant(s)</b> NAKASHIMA ET AL.	
	<b>Examiner</b> GREGORY CLARK	<b>Art Unit</b> 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09/22/2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-44 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>09/22/2009</u> .  | 6) <input type="checkbox"/> Other: _____                          |

### DETAILED ACTION

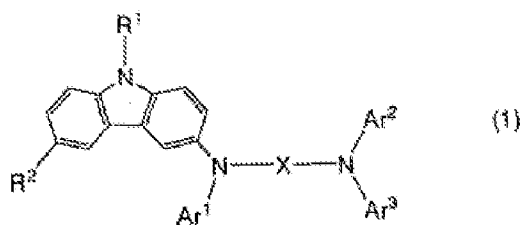
The examiner acknowledges the receipt of applicants' argument dated 09/22/2009.

### Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

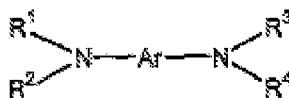
1. **Claims 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Claims Tuan (WO 03/008515).**

2. **Regarding Claims 1**, the applicant claims a carbazole derivative represented by a general Formula 1 shown below:

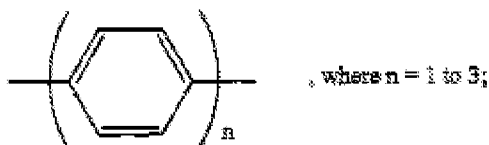


R2 can be hydrogen or an alkyl group and Ar1-Ar3 can be aryl groups 6-25 carbons.

Tuan discloses a compound used in an electroluminescent device (paragraph 45) represented by Formula T-1 (page 3) shown below:



wherein Ar is an aromatic group selected from:



Wherein for formula T-1:

Ar is shown above as a phenyl group that corresponds to applicants' X group

R1, R3 and R4 can be an aryl groups corresponding to applicants' Ar1-Ar3

(abstract).

R2 can be a tricyclic heterocyclic aromatic (abstract) which includes formula T-2

(carbazole):



Where Q can be N-R5 (R5 = H or alkyl) (page 4).

The examiner takes the position that one looking at the disclosure of Tuan would immediately envisage the claimed structure as Ar1-Ar3 are generic and significantly overlap the groups suggested in the reference and the carbazole group claimed is clearly taught as being part of a small group of alternatives.

### Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

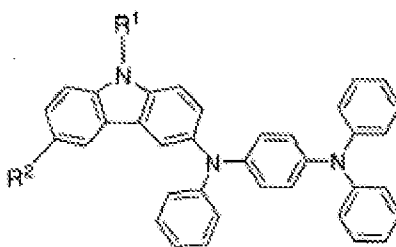
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1-3, 5-7, 9-11, 13-15, 17-19, 21-23, 25-27, 29, 30-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuan (WO 03/008515).**

4. **Regarding Claims 2-3, 6-7, 10 and 11** Tuan discloses Q of formula T-2 (above) is N-5 which can be an alkyl group but fails to mention a specific group. The applicant claims methyl, ethyl and t-butyl.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to have selected from known alkyl groups which would have included the claimed alkyl groups, absent unexpected results.

5. **Regarding Claims 5 and 9**, the applicant claims a compound represented by formula 5:



Tuan discloses formula T-1 and T-2 (above):

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Formula T-1:

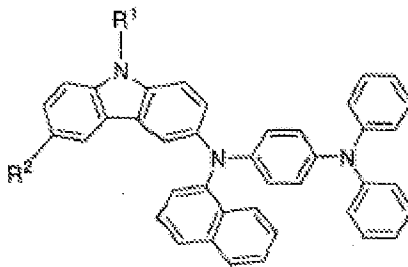
- Ar is shown above as a phenyl group that corresponds to applicants' phenyl spacer group
- R1, R3 and R4 can be an aryl groups corresponding to applicants' three mono-substituted phenyl groups (abstract).

Formula T-2

- R2 can be a carbazole group which corresponds to applicants' carbazole group where the nitrogen is substituted by an alkyl group.

While Tuan does not specifically mention R1, R3 and R4 as phenyl groups, it would have been obvious to a person of ordinary skill in the art at the time of the invention to have selected from known aryl groups which would have included phenyl groups, absent unexpected results.

6. **Regarding Claims 13**, the applicant claims a compound represented by formula 103:



Tuan discloses formula T-1 and T-2 (above):

Formula T-1:

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- Ar is shown above as a phenyl group that corresponds to applicants' phenyl spacer group
- R1, R3 and R4 can be an aryl groups corresponding to applicants' two mono-substituted phenyl groups and the naphthalene group (abstract).

Formula T-2

- R2 can be a carbazole group which corresponds to applicants' carbazole group where the nitrogen is substituted by an alkyl group

While Tuan does not specifically mention R1, R3 and R4 as two phenyl groups and a naphthalene group, it would have been obvious to a person of ordinary skill in the art at the time of the invention to have selected from known aryl groups which would have included phenyl and naphthalene groups, absent unexpected results.

7. **Regarding Claims 14-15**, Tuan discloses Q of formula T-2 (carbazole group) (above) is N-R5 (where R5 corresponds to applicants' R1 in formula 1, above) can be an alkyl group but fails to mention a specific group. The applicant claims methyl, ethyl and t-butyl.

As Tuan teaches a substituted carbazole compound that reads on the generic structure where the nitrogen atom can have an alkyl substituent, it would have been obvious to a person of ordinary skill in the art at the time of the invention to have selected from a simple series of alkyl groups such as methyl, ethyl and t-butyl which read on the instant limitations, absent unexpected results.

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8. **Regarding Claims 17, 21, 25, 29, 33, 34, 35, 36, 37, 38, 39, 40**, the applicant claims an OLED where a compound represented by formula 5 (shown above) is located between two electrodes.

Tuan discloses an organic light emitting device (OLED) (per claims 34, 35, 38 and 40) containing a carbazole compound, formula T-1 (per claims 17, 21, 25, 29, 36, 37, 39). The examiner notes that the Ar1-Ar3 in applicants' formula(s) 1-6, 103 and 104 are in scope with formula T-1 disclosed by Tuan where R1, R3 and R4 are aryl groups. As a result, formula T-1 (shown above) reads on applicants' formula(s) 1-6 and 103 as discussed above in sections 2 and 6.

Formula T-1 can be located in the hole injecting layer or light emitting layer (page 11) which is located between two electrodes (page 16) (per claim 17). The hole injecting layer is in contact with the anode (page 16). (per claim 33)

Tuan further discloses formula T-1 and T-2 (shown above):

Formula T-1:

- Ar is shown above as a phenyl group that corresponds to applicants' phenyl spacer group
- R1, R3 and R4 can be an aryl groups corresponding to applicants' three mono-substituted phenyl groups (abstract).

Formula T-2

- R2 can be a carbazole group which corresponds to applicants' carbazole group where the nitrogen is substituted by an alkyl group.

While Tuan does not specifically mention R1, R3 and R4 as phenyl groups, it would have been obvious to a person of ordinary skill in the art at the time of the invention to have selected from known aryl groups which would have included phenyl groups, absent unexpected results.

9. **Regarding Claims 18-19, 22-23, 26-27 and 30-31**, Tuan discloses Q of formula T-2 (carbazole group) (above) is N-R5 (where R5 corresponds to applicants' R1 in formula 1, above) can be an alkyl group but fails to mention a specific group. The applicant claims methyl, ethyl and t-butyl.

As Tuan teaches a substituted carbazole compound that reads on the generic structure where the nitrogen atom can have an alkyl substituent, it would have been obvious to a person of ordinary skill in the art at the time of the invention to have selected from a simple series of alkyl groups such as methyl, ethyl and t-butyl which read on the instant limitations, absent unexpected results.

10. **Regarding Claim 33**, the applicant claims an OLED where a compound represented by formula 5 (shown above) is located between two electrodes.

Tuan discloses an organic light emitting device (OLED) containing a carbazole compound (Formula T-1 shown above) which reads on applicants' formula 1 as discussed in section 2. Formula T-1 can be located in the hole injecting layer or light

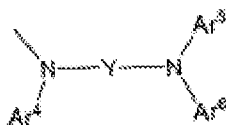
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emitting layer (page 11) which is located between two electrodes (page 16). The hole injecting layer is in contact with the anode (page 16).

11. **Regarding Claims 41-44, Tuan discloses that the OLED can be used in a flat panel displays (abstract). The flat panel display is viewed as inclusive of a personal computer monitor.**

12. **Claims 4, 8, 12, 16, 20, 24, 28 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuan (WO 03/008515) in view of Thomas (J. Am. Chem. Soc., 123, p. 9401-9411) and further in view of Brunner (2006/0073357).**

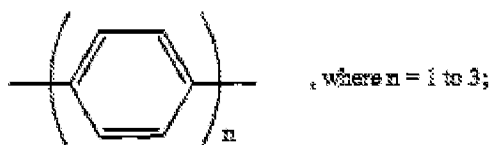
**Regarding Claims 4, 8, 12, 16, 20, 24, 28 and 32, Tuan fails to teach a compound where R2 of formula 1 is represented by formula 2:**



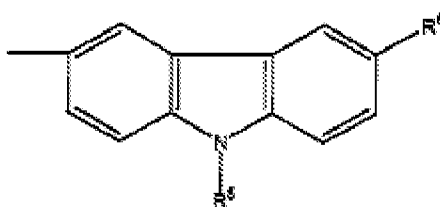
Tuan discloses an OLED containing formula T-1 substituted (page 3) (shown below).



wherein Ar is an aromatic group selected from:



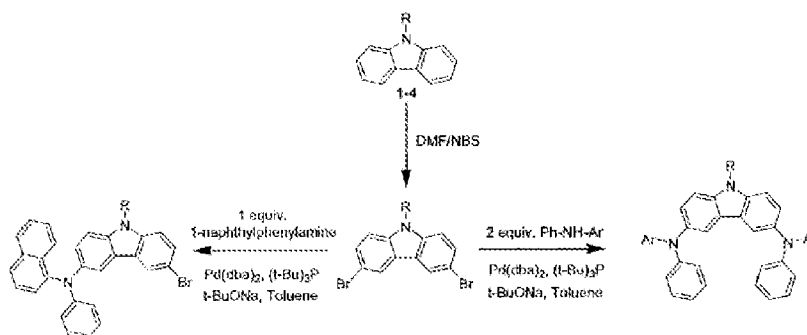
Tuan further discloses the R2 can be a di-substituted carbazole represented by formula T-3 where formula R6 can be a halo group (page 6):



Formula T-3 with halo substitution at R6 is viewed a precursor to the synthesis of compounds that reads on applicants' claimed structured as discussed below:

In essence, Tuan teaches a mono-substituted carbazole (one triarylene diamine group bonded to carbazole) while the applicant claims di-substituted carbazole (two triarylene diamine groups [formula 2] bonded to carbazole). The examiner notes that the Ar1-Ar3 in applicants' formula(s) 1-6, 103 and 104 are in scope with formula T-1 disclosed by Tuan where R1, R3 and R4 are aryl groups.

The methods used to make di-substituted carbazoles for usage in OLED(s) are known in the art as disclosed by Thomas who discloses that carbazole derivatives used in electroluminescent devices can be made by a reaction with N-bromosuccinimide (NBS) to make di bromo carbazoles (Scheme 1):



Similarly Brunner discloses that the mono bromo carbazole derivatives used in electroluminescent devices can be made in a similar manner by reducing the molar quantity of NBS in the above bromination reaction (paragraphs 141-142).

As Thomas and Brunner disclose methods to make mono and di substituted carbazoles for usage in OLED(s), it would have been obvious to a person of ordinary skill in the art at the time of the invention to have made a di-bromo carbazole derivative followed by a subsequent reaction with two triarylene diamine groups that reads on formula(s) 1-6, 103 and 104 to produce the claimed compound, absent unexpected results.

With a reasonable expectation of success, at the time of the invention it would have been obvious for a synthetic chemist to have made a variety of substituted carbazoles which would include the mono and di carbazole species through synthetic routes of Thomas and Brunner prepare organic compounds useful in electroluminescent devices that reads on the claimed structures.

### **Response to Arguments**

The examiner acknowledges that formula 3 disclosed by Richter in the previous office action does not read on applicants' claimed structure since the carbazole group is positioned between the nitrogen atoms as opposed to in positions R1-R4.

The examiner has applied a new reference set forth in the current non-rejections.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY CLARK whose telephone number is (571)270-7087. The examiner can normally be reached on M-Th 7:00 AM to 5 PM Alternating Fri 7:30 AM to 4 PM and Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/  
Supervisory Patent Examiner, Art Unit 1794

GREGORY CLARK/GDC/  
Examiner  
Art Unit 1794